

WHAT IS CLAIMED IS:

1. A network storage virtualization method in a network storage system having a plurality of network storage devices, said method comprising:

allowing a client connected via a network to access the network  
5 storage devices as one virtual network storage system; and  
permitting said client to access the network storage devices separate  
from said virtualized network storage system.

2. A network storage virtualization method according to claim 1,  
10 wherein a first network storage device includes a disk interface (I/F) which is  
connected to an apparatus having a function of forming said network storage  
devices as one virtual network storage device, and

wherein a second network storage device includes a disk I/F which is  
connected to said apparatus having a function of forming said network  
15 storage devices as one virtual network storage device and a host I/F which is  
connectable to an external device so as to permit said external device to  
access the network storage devices separate from said apparatus having a  
function of forming said network storage devices as one virtual network  
storage device.

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3. A network storage virtualization method according to claim 2,  
wherein said external device is permitted to access a secondary volume  
which is a copy of a primary volume and not permitted to access volumes  
other than said secondary volume.

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4. A network storage virtualization method according to claim 3,  
wherein said external device accesses said secondary volume via said host  
I/F of said second network storage device.

5 5. A network storage virtualization method according to claim 4,  
wherein a storage area network (SAN) is connected between said external  
device and said host I/F of said second network storage device.

6. A network storage virtualization method according to claim 1,  
10 wherein a first network storage device includes a disk interface (I/F) which is  
connected to an apparatus having a function of forming said network storage  
devices as one virtual network storage device, and  
wherein a second network storage device includes a first host I/F which  
is connected to said apparatus having a function of forming said network  
15 storage devices as one virtual network storage device and a second host I/F  
which is connectable to an external device so as to permit said external  
device to access the network storage devices separate from said apparatus  
having a function of forming said network storage devices as one virtual  
network storage device.

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7. A network storage virtualization method according to claim 6,  
wherein said external device is permitted to access a secondary volume  
which is a copy of a primary volume and not permitted to access volumes  
other than said secondary volume.

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8. A network storage virtualization method according to claim 7,  
wherein said external device accesses said secondary volume via said  
second host I/F of said second network storage device.

5 9. A network storage virtualization method according to claim 8,  
wherein a storage area network (SAN) is connected between said external  
device and said second host I/F of said second network storage device.

10 10. A network storage virtualization method according to claim 8,  
wherein a wide storage area network (WSAN) is connected between said  
apparatus having a function of forming said network storage devices as one  
virtual network storage device and said first host I/F of said second network  
storage device.

15 11. A network storage virtualization method according to claim 3,  
further comprising the step of:

configuring access control of said secondary volume from outside of  
said apparatus having a function of forming said network storage devices as  
one virtual network storage device.

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12. A network storage virtualization method according to claim 11,  
wherein said configuring step comprises the steps of:

creating a mirroring pair between said primary volume and said  
secondary volume at a certain point in time by taking a complete initial copy of

said primary volume and storing said complete initial copy in said secondary volume;

receiving in said second storage device a suspend request;

placing the mirroring pair into a suspend status to permit setting of the

5 access control according to user selection;

If the user chooses a read only mode, setting said secondary volume to the read only mode for input/output (I/O) requests from said external device and re-synchronizing the mirroring pair; and

if the user chooses a read/write mode, setting said secondary volume  
10 the read/write mode for input/output (I/O) requests from said external device and re-synchronizing the mirroring pair.

13. A network storage virtualization method according to claim 12, wherein when said secondary volume is set to the read only mode access to  
15 said secondary volume is performed according to the steps of:

suspending synchronization of the mirroring pair including said primary volume and said secondary volume;

permitting access to data on said secondary volume in response to an I/O request via the host I/F; and

20 upon completion of said access, re-synchronizing the mirroring pair.

14. A network storage virtualization method according to claim 12, wherein when said secondary volume is set to the read/write mode access to said secondary volume is performed according to the steps of:

suspending synchronization of the mirroring pair including said primary volume and said secondary volume;

permitting access to data on said secondary volume in response to an I/O request via the host I/F; and

5        upon completion of said access, re-synchronizing the mirroring pair.

15.    A storage system comprising:

a first network storage device which includes a primary volume;

a second network storage device which includes a secondary volume

10    which is a copied volume of the primary volume and volumes other than the secondary volume; and

a virtualization apparatus, which is connected to each of said first and second network storage devices, and allows a client connected via a network to access the network storage devices as one virtual network storage system

15        wherein said client is permitted to access the network storage devices separate from said virtualization apparatus.

16.    A storage system according to claim 15, wherein said first network storage device includes a disk interface (I/F) which is connected to

20    virtualization apparatus, and

wherein a second network storage device includes a disk I/F which is connected to said virtualization apparatus and a host I/F which is connectable to an external device so as to permit said external device to access the network storage devices separate from said virtualization apparatus.

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17. A storage system according to claim 16, wherein said external device is permitted to access said secondary volume which is a copy of said primary volume and not permitted to access said volumes other than said secondary volume.

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18. A storage system according to claim 17, wherein said external device accesses said secondary volume via said host I/F of said second network storage device.

10 19. A storage system according to claim 18, wherein a storage area network (SAN) is connected between said external device and said host I/F of said second network storage device.

20. A storage system according to claim 15, wherein said first network storage device includes a disk interface (I/F) which is connected to said virtualization apparatus, and

wherein said second network storage device includes a first host I/F which is connected to said virtualization apparatus and a second host I/F which is connectable to an external device so as to permit said external device to access the network storage devices separate from said virtualization apparatus.

21. A storage system according to claim 20, wherein said external device is permitted to access said secondary volume which is a copy of said

primary volume and not permitted to access said volumes other than said secondary volume.

22. A storage system according to claim 21, wherein said external  
5 device accesses said secondary volume via said second host I/F of said second network storage device.

23. A storage system according to claim 22, wherein a storage area  
network (SAN) is connected between said external device and said second  
10 host I/F of said second network storage device.

24. A storage system according to claim 22, wherein a wide storage  
area network (WSAN) is connected between said virtualization apparatus and  
said first host I/F of said second network storage device.

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25. A storage system according to claim 17, wherein access control  
of said secondary volume is configured from outside of said virtualization  
apparatus.

20 26. A storage system according to claim 25, wherein said access control of said secondary volume is configured by creating a mirroring pair between said primary volume and said secondary volume at a certain point in time by taking a complete initial copy of said primary volume and storing said complete initial copy in said secondary volume, receiving in said second  
25 storage device a suspend request, placing the mirroring pair into a suspend

status to permit setting of the access control according to user selection, If the user chooses a read only mode, setting said secondary volume to the read only mode for input/output (I/O) requests from said external device and re-synchronizing the mirroring pair, and if the user chooses a read/write mode, setting said secondary volume the read/write mode for input/output (I/O) requests from said external device and re-synchronizing the mirroring pair.

27. A storage system according to claim 26, wherein when said secondary volume is set to the read only mode access to said secondary volume is performed by suspending synchronization of the mirroring pair including said primary volume and said secondary volume, permitting access to data on said secondary volume in response to an I/O request via the host I/F, and upon completion of said access, re-synchronizing the mirroring pair.

28. A storage system according to claim 26, wherein when said secondary volume is set to the read/write mode access to said secondary volume is performed by suspending synchronization of the mirroring pair including said primary volume and said secondary volume, permitting access to data on said secondary volume in response to an I/O request via the host I/F, and upon completion of said access, re-synchronizing the mirroring pair.